Belcher; five European Geckos (*Phyllodactylus europæus*) from Italy, presented by Prof. H. H. Giglioli, C.M.Z.S.; a Cape Ant-bear (*Orycheropus capensis*) from South Africa, purchased.

INTELLECT IN BRUTES

WE have another batch of letters on this subject, the essential points of which we shall endeavour to give in brief space:—

Mr. Wm. Hogg tells us of an incident he witnessed when calling on Mr. W. H. Michael, a gentleman well known at the parliamentary bar, who resides at Queen Anne's Gate, St. James's Park. While they were sitting in the study, the French window of which communicates with a garden at the back of the house, and had a crank latch by which it could be opened on either side, a cat presented herself outside the window, pleading for admission. She continued to plead for some time, and finding no help from within she resolved to trust to her own powers. Eying the latch, which was four feet above her, she made a spring, caught hold of the crank with her fore feet, and putting her hind feet against the other half of the window as a fulcrum she pressed open the window. This she would do several times in succession. Mr. Michael informed Mr. Hogg that the cat had never been taught to do this.

D. R. S. sends the story of a little terrier that left her puppies only once a day to be fed, gulping down hurriedly a great quantity of porridge. Returning quickly to her family she would put up all the porridge in order that she and her puppies might together enjoy a hearty meal. When the terrier was scolded for a fault it rushed away to a little distance and catching up anything it could get hold of at once—a bit of stick, a straw, a slipper or anything at hand—it would come coweringly and lay it down at our feet, with an expression of utter submission. If we were not propitiated it would run off a second time and bring another peace-offering, often in its distress catching things it would not at any other time have dared to touch.

M. W. T. writes:—A farmer, in Somersetshire, was going to a neighbouring village some three miles distant, and, not wishing to take his dog he ordered him home. The dog reluctantly obeyed. When the man arrived at a spot, about half way on his road, where the short cut he had taken across the fields joined the more circuitous road, he found the dog waiting for him. Evidently the animal had taken the longer route, which he doubtless knew, calculating on meeting his master at that point, and thus gaining his end without hindrance.

Mr. John Harmer, of Wick, Arundel, possessed a few years ago a very fine and intelligent tom-cat which was much addicted to plundering a rabbit-warren about a mile from his home. After a time it was noticed that before he proceeded on one of his expeditions "Sam" completed his toilet by wallowing in the filth turned out of the tame rabbits' hutches, he taking particular care that his neck and breast should be in as disgusting a condition as possible by smearing them up and down till both were saturated and the fur all matted together.

Mr. J. J. Cole of Mayland, Sutton, Surrey, writes:—It has been my custom to have—not a letter-box in a door in the usual way but the plate and flap in the bottom of a window sash near. I had a cat which often saw a servant go to the window on hearing the flap moved by the postman, and which, when shut out used to jump on to the window sill and rattle the flap and when the servant was seen through the glass jump down to be let in at the door. I knew a horse which during week days went round and round to the left, grinding in the cellar of a snuff maker in London. On Sundays his owner turned him out in a field at his place in the country where the horse went round and round all day long unwinding himself the other way. Why?

Mr. B. G. Jenkins describes a scene he witnessed between the large insect known as "daddy long-legs" and a small spider. The former got caught by one of its hind-legs by a pendant thread of cobweb about eight inches long, at the other end of which was the small spider. The spider cautiously descended on the thread, doubling it as he came, and secured the insect's leg more firmly. He then ascended about three inches, and drew the insect up about half an inch; but a violent resistance on the part of the latter induced him to give up the attempt. He, however, went up the thread, strengthening it as he went, and coming down again to the same place, evidently attempted once more to raise his prey, but without success, for the insect resisted so stoutly that it appeared to me to stretch the thread. The spider, Mr. Jenkins writes, saw clearly that the insect was too strong for him, that he would never be able to draw him up to the centre of his web, and that if he did not take very summary measures he would lose him altogether; so, on the principle that half a loaf is better than no bread, he set to work to secure a portion of it. The hind-leg of the insect, to which he had his web fastened, was composed of four jointed portions. Round three of these he busied himself weaving a web. Mr. Jenkins noticed particularly that he did not go up to the last jointed portion, that attached to the body. Having well secured these three, he moved up to the joint, and for a few moments appeared perfectly still. Suddenly the insect darted away, leaving three-quarters of its leg behind. What other explanation is there than that the spider disconnected it at the joint? Quietly ascending the thread, which he carried with him, and of course the leg as well, he properly placed the latter, settled down at the union of the two uppermost portions, gorged himself with juices from above and below, and then retired for the night.

Several correspondents express surprise at Mr. Henslow's position with regard to "abstract" and "practical" reasoning. They think that several of the instances adduced render that position untenable, and prove that in their degree the animals referred to showed themselves possessed of powers of "abstract" reasoning. With regard to the dog and bell story, Dr. Rae writes:—It was never intended to be understood that the dog associated the bell with "a *particular* maid," as Mr. Henslow puts it; any of the other servants would have done equally well. The dog could only show his reasoning powers by declining to ring the bell; for had he rung it, Mr. Henslow or any one else would naturally have said that the "brute" had shown no reasoning powers at all. Mr. Henslow has passed over without notice the fox and gun story, which, by his own definition, was as clearly a case of abstract reasoning as could be adduced, differing only in form of carrying into effect from what he would have recommended, which, if adopted by the fox, would have led to its destruction.

Dr. G. Frost sends the following good story:—

In answer to Mr. Henslow's request for an example of "abstract reasoning" in the lower animals (NATURE, vol. xix. p. 433), I beg to subjoin the following:—Our servants have been accustomed during the late frost to throw the crumbs remaining from the breakfast table to the birds, and I have several times noticed that our cat used to wait there in ambush in the expectation of obtaining a hearty meal from one or two of the assembled birds. Now, so far, this circumstance in itself is not an "example of abstract reasoning." But to continue: For the last few days this practice of feeding the birds has been left off. The cat, however, with an almost incredible amount of forethought, was observed by myself, together with two other members of the household, to scatter crumbs on the grass, with the obvious intention of enticing the birds. I think Mr. Henslow might now be convinced that animals also possess in an inferior degree that boasted reasoning power which is generally supposed to belong to man alone.

THE PLANE OF POLARISATION ELECTRO-MAGNETICALLY ROTATED IN A VAPOUR

IT is known that Faraday did not succeed in proving electro-magnetic rotation of the plane of polarisation of light in gases, nor have others succeeded. Considering the interest attaching to this question, Herr Kundt and Herr Röntgen lately thought to repeat the attempt with very strong currents and under the most favourable conditions. The result is that they have been able to prove the rotation, at least in the case of sulphide of carbon vapour. (Their researches have been communicated to the Munich Academy.)

Sulphide of carbon was chosen because, on the one hand, it shows a strong electro-magnetic rotation in the liquid state, and on the other, its vapour has a considerable tension, even at low temperatures. An iron tube was used for inclosure and heating of the substance; it was closed at the two ends with glass plates 1 ctm. thick, and itself inclosed in a tin-plate tube; so that steam could be led between the tubes to heat the inner tube throughout to 100°. The outer tube was surrounded by six large wire-coils, each having 400 windings of wire 3mm. thick,

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through which was passed the current from sixty-four large Bunsen elements. A little sulphide of carbon was introduced into the inner tube, and the air having been driven out by vapour forming at ordinary temperature, the tube was closed and fixed in position, and steam was sent through the space round it.

When the whole tube had taken the temperature of boiling water the glass plates and the sulphide of carbon vapour within became quite transparent. A beam of light rectilinearly polarised by a Nicol was now sent through, and a Nicol at the other end extinguished it. The current of the sixty-four elements being now allowed to flow, a distinct brightening of the field was observed. The brightening became still greater when, after closing the circuit, the foremost Nicol was turned to darkness, and the current then reversed with a commutator. The rotation of the plane of polarisation occurred, as was to be expected, in the direction in which the positive current passed through the wire coils.

To test whether the rotation might not be due wholly or in part to the glass plates closing the inner tube, the experiment was made without any sulphide of carbon in this tube. A weak rotation, due to the glass, was indeed observed, much smaller than in the other case. To avoid this, however, as much as possible, the wire coils next the glass plates were shut out from the circuit. The four coils now traversed by the current were so far from the plates that their influence must have been very small, indeed the plates then gave no perceptible rotation. Sulphide of carbon having been again admitted, and the experiment repeated, there was a well-marked brightening as before, when the current passed. The amount was roughly estimated at half a degree.

It is thus proved that saturated sulphide of carbon vapour at about 100°, *in the magnetic field, rotates the plane of polarisation of light.*

Sulphuric ether was tried in the same way, but gave no effect. The authors consider it can hardly be doubted that, with suitable arrangements, the rotation may be demonstrated in the case of unsaturated vapours and gases. They are engaged in making an apparatus which will enable them to examine permanent gases at very high pressures in the magnetic field, in order to prove the rotation in their case, and, if possible, to measure the phenomenon. "It would be specially interesting," they remark, "to ascertain whether oxygen rotates the plane of polarisation in the same direction as other gases."

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

A BROAD and liberal scheme has been published by the Cambridge Syndicate on the affiliation of local Colleges to the University as suggested in various Memorials. They have taken a large amount of evidence and have had interviews with deputations from Nottingham and Sheffield. They have also held conferences with a Committee of the Hebdomadal Council of the University of Oxford, with whom they find themselves in general agreement. The Syndicate recommend that application be made to the University of Cambridge Commissioners for the powers required to enable the University to affiliate local Colleges, and that the following conditions of affiliation be established by grace of the Senate. Any educational institution within the British dominions, in which the majority of the students are over seventeen years of age, may be admitted on condition that it be incorporated by Royal Charter, or established on a permanent and efficient footing; that the University shall be represented on its Governing Body, and undertake the general conduct of its Examinations; and that the connection between the University and an affiliated College shall be established and shall be terminable by a grace of the Senate, or by a resolution of the Governing Body of the College. Persons who have completed an approved course of three years at an affiliated College, passing satisfactorily the Examinations connected with that course, will be entitled to receive a University Certificate, and if they obtain honours in the final Examination connected with that course, shall be excused the previous Examination; and provided they obtain a degree by one of the Tripos Examinations will be permitted to take their degree after only six terms' residence at Cambridge. In each College there are to be three examinations yearly, the Annual College Examination, the First and the Second Examinations, the Annual College Examination is to be held in subjects taught with the sanction of the University, in the College, and be open to those students only who have satisfactorily attended the teaching in these subjects. To pass the First Examination every candidate will be required to satisfy the Examiners in (1) Arithmetic; (2) Euclid, Books I., II., and III.; and Algebra, to Quadratic Equations inclusive; (3) One of the following languages: Latin, Greek, French, Italian, German. Candidates will be at liberty to take up more than one language, and one or more additional subjects, including Heat, Experimental Mechanics, Chemistry, Botany, and Mathematics. 4. The Second Examination shall include four groups: (1) Ancient and Modern Languages, two to be taken. (2) Mathematics, one higher subject, pure or applied, being required. (3) Natural Science. Candidates pass in Elementary Chemistry and Physics, and also in one of the following:—Higher Chemistry, Higher Physics, Animal and Vegetable Physiology, Comparative Anatomy with selected portions of Zoology, Vegetable Anatomy and Physiology with Classificatory Botany, Geology and Physiography, Mineralogy. Candidates to pass in (1) English Constitutional History and (2) Political Economy or Logic, and subjects connected with History, Literature, and Philosophy. A pass in one group will give a pass in this second examination, and honours may be obtained on the minimum number of subjects. The Syndicate think it desirable to avoid if possible increasing seriously the severe strain caused by the outside work of the University. The sections and groups of the senior and higher local examinations are in general correspondence with the scheme, and the lectures at the centres are under the superintendence of the Syndicate for conducting local examinations and lectures. Thus there is machinery in existence which may, with some modifications, be conveniently and properly used. It is thought desirable that the Universities of Oxford and Cambridge should, as far as practicable, act in concert in conducting this great scheme of affiliation. It is recommended that the scheme be so administered as to be self-supporting.

THE Cambridge Council of the Senate propose to repeal entirely the few unrepealed provisions in the will of Dr. Woodward relating to the Professorship of Geology, and to frame a new statute on a plan already approved for the Professorship of Chemistry. The same plan is likely to be followed with regard to the chairs of Anatomy, Botany, and Mineralogy, the nomination of half the Electoral Board in the case of anatomy falling to the Board of Medical Studies and in the other professorships named, to the Board of Natural Science Studies.

IN consequence of the greater importance to be given in future to the first part of the Cambridge Natural Sciences Tripos, held in June, a practical and oral examination is to be held then, two extra days being allowed for this.

THE Higher Senior Class of Mathematics in University College, London, which had been conducted by the late Prof. Clifford, has been intrusted during the summer term of the present Session to Mr. M. J. M. Hill, M.A., Fellow of the College, and fourth wrangler and bracketed equal Smith's prizeman this year at Cambridge.

DR. WITTROCK, the well-known algologist of Upsala, has been appointed lecturer on Botany, and curator of the botanical section of the museum at Stockholm.

THE commission of the Chamber of Deputies proposes to establish a compulsory system of education in France. Parents neglecting to comply with the provisions of the law are to be fined, and in certain cases to be sent to prison for a certain period. The expenses required for enlarging school accommodation and adding to the number of teachers are to be supported by the National Exchequer.

SCIENTIFIC SERIALS

American Journal of Science and Arts, March.—In the opening paper Prof. Norton contends that under varying conditions the ultimate molecules of bodies are subject to changes in the intensity of their attraction or repulsion, at a given distance of neighbouring molecules (temperature and chemical constitution remaining constant). Evidence of this is found in the phenomena of permanent distortion of materials after temporary subjection to a force of stress; in observed changes in the mechanical properties of materials, through tension, pressure, heat, &c.; change of mechanical properties of a body through presence of minute quantities of other substances; and certain facts in chemical physics (phenomena of solution, allotropy, the nascent

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